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JUPITER'S RED SPOT DYNAMICS

Our understanding of Jupiter's dominant feature, the spectacular Great Red Spot (GRS), has been greatly enhanced by studies of many pictures taken of it by the Voyagers. The images were improved by special techniques employed by JPL's Image Processing Laboratory (IPL).

The GRS supposedly was discovered by Sir Robert Hooke over 300 years ago, and has been observed more or less continuously for 100 years. A vast, elliptical anticyclone covering over 200 million square kilometers, it is the largest known single atmospheric vortex.

Voyager photo sequences designed to measure motions in and around the GRS confirm that the highest velocities, over 100 meters per second (some 225 miles per hour), are concentrated in a white and hazy oval ring around the storm's periphery. The velocities are very low in the redder interior.

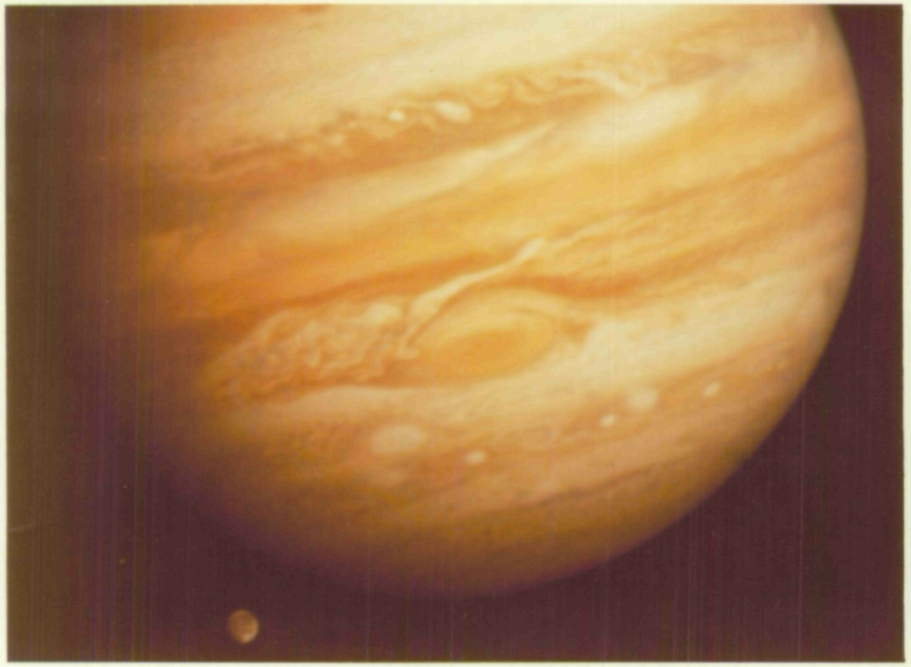
The dynamics of white, oval, Earth-size storms in the Jovian atmosphere appear to be remarkably similar to that of the GRS, except for the latter's quiescent interior.

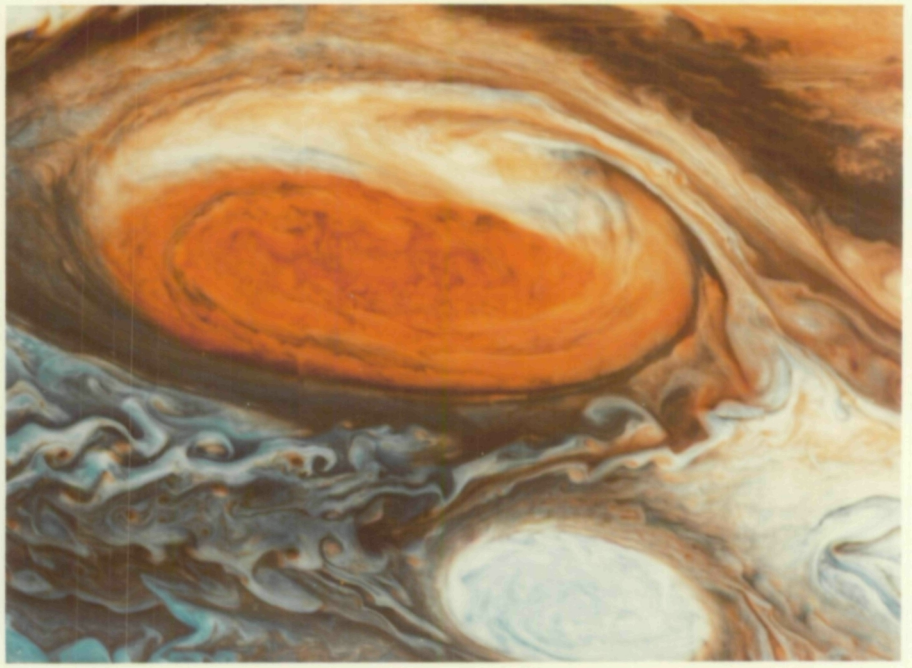
The three-fold difference in size between the GRS and the white ovals can probably be explained by the difference in latitudes of these features. This can be taken to mean that the GRS is not unique but rather is the largest of many vortices in the swiftly spinning Jovian atmosphere.

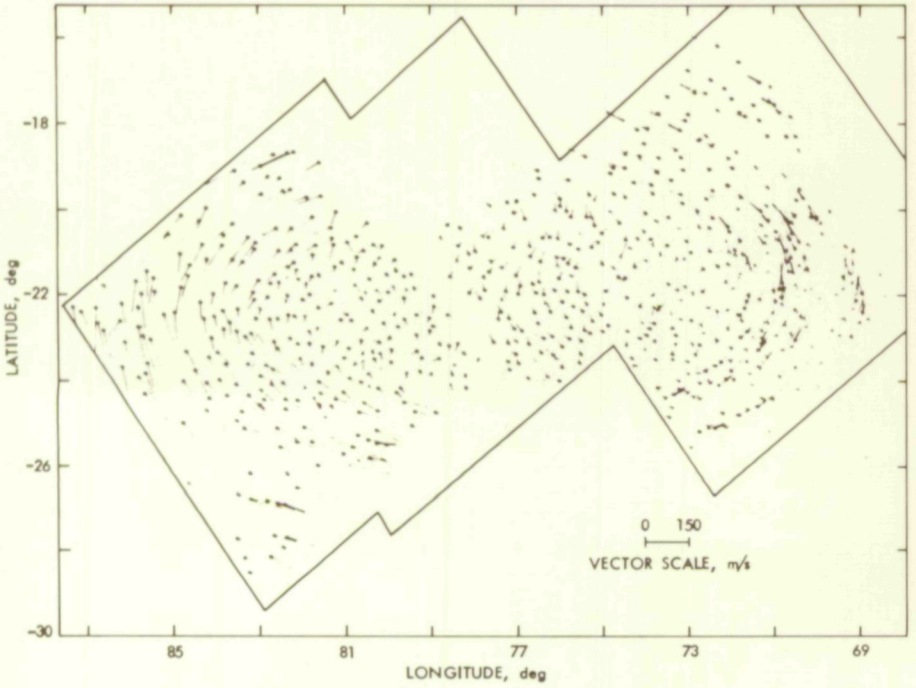
Ongoing JPL studies make use of the measured velocity fields around the GRS and white ovals to identify energy sources for Jupiter's long-lived storms. A major question that soon should be answered is: Does the ambient wind drive the GRS or is the opposite true? These studies hold the key to unlocking the secrets of the mysterious, beautiful Great Red Spot.

Special enhancement of Voyager pictures by IPL made possible the inference that higher velocities existed around the periphery of the GRS. The Voyager color photographs consisted of a blend of several monochromatic, digital images. IPL made the red parts redder and the blue parts bluer, facilitating the studies of cloud structures associated with the Great Red Spot.

Figure (opposite page): At top left, Jupiter (with Great Red Spot just below center) is seen by Voyager 1 from 40 million kilometers distance. In top right, Great Red Spot is shown from only 24,000 kilometers, and, lower right, at the same distance but greatly enhanced with smallest features visible about 30 kilometers across. White feature below the GRS is one of several white ovals first observed 40 years ago from Earth. Lower left drawing shows how Great Red Spot winds swirl, many of them at speeds well over 200 mph (100 to 150 meters per second).



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73
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